REMARKS

Claim 1 has been amended to move "loose" from the preamble to the body of the claim, while new claim 44 has been added to make clear that the polymer coating is melt-solidified. Support for this limitation can be found in the working example on pages 7 and 8 of the application in which quartz sand grains heated to 250° C were mixed with pellets of Engage 8400 polyolefin elastomer and the mixture so formed agitated for 20 minutes before being quenched by addition of water. As can be seen from page 3 of the Dow-DuPont advertising literature included with the concurrently-filed Information Disclosure Statement, Engage 8400 polyolefin elastomer has a melting temperature of about 65° C and a melt flow index of 30 g/10 min. This makes clear that coating of the sand grains in this example was accomplished by melting and subsequent solidification of this polymer on these sand grain substrates.

Also cited in the concurrently-filed Information Disclosure Statement are three patent documents generally describing the so-called "Shell" or "Corning" Process used to form resin-coated sand products for the foundry industry. In addition, the relevant portion of the office action received in the corresponding Japanese application, including cited references, has also been cited in this Information Disclosure Statement.

Claim 1

Applicants again respectfully traverse the rejection of the claims under 35 U.S.C. 103. A fundamental feature of the coating process described in the primary reference, U.S. 5,041,320 to Meredith, is that an aqueous emulsion (latex) of a natural or synthetic rubber is used as the coating material. As well understood in the art, aqueous rubber emulsions are composed of small, individual, discrete particles of a rubber polymer emulsified in water. When such emulsions are used for coating purposes, the individual rubber particles coalesce into a more or less continuous surface layer of loosely agglomerated rubber particles as the water in the emulsion evaporates, usually as a result of mild heating to temperatures slightly above the boiling point of water, *e.g.*, 140° C. No melting of the polymer is involved. Cross-linking agents capable of being activated under these mild heating conditions are normally included. As a result, the individual rubber particles bond to one another at their contacting surfaces, thereby

producing relatively coherent coatings. Nonetheless, the coatings obtained are still composed of discrete rubber particles more or less securely bonded to one another at their contacting surfaces through cross-linking bonds.

As noted by the examiner, Meredith differs from current claim 1 at least because it fails to describe the particular polymer recited in this claim, *i.e.*, a polymer which (1) is thermoplastic, (2) has a melt flow index of 20-40 g/10 min, and (3) has a Shore A hardness of 40-90. To remedy these defects, the examiner cites the Valligny reference, U.S. 2001/0011784, which shows certain **molding resins** in the form ground particles made from the same polyolefin polymer used in the first working example of the present application, *i.e.*, Engage 8400 from Dow-DuPont Elastomers. As best understood, this rejection is based on the notion that it would have been obvious to replace the emulsified rubber polymer particles of Meredith's rubber latexes with the ground Engage 8400 particles of Valligny, since both particles are used to form flexible, elastic coatings. Applicants respectfully traverse this rejection.

Valligny neither discloses nor suggests that its **molding resins** should or could be used as coatings if supplied in latex form. Rather, Valligny teaches the exact opposite. Thus, Valligny expressly states in Paragraph [0033] that an earlier attempt to make coatings from molding resins which were not heated to melting were unacceptable because the individual resin particles did not stick together, even though suitable grafting and cross-linking agents were present. Thus, it would not have been obvious to replace Meredith's rubber polymer particles with Valligny's thermoplastic elastomer particles, since the reasonable expectation of this substitution would have been **failure**.

MPEP §2143.02 makes clear that, in order to establish *prima facie* obviousness, the prior art must provide a reasonable expectation of success. In other words, one of ordinary skill in the art must be able to reasonably predict that the proposed modification of the prior art would produce the beneficial result being sought. In this case, one of ordinary skill in the art would have predicted failure from the modification proposed by the examiner, because the Valligny reference unequivocally teaches that coatings made from its polymers which were not heated to melting were failures.

That being the case, it is clear that the combination of Meredith and Valligny as proposed in this rejection is nothing more than a hindsight reconstruction of the prior art using Applicants' own specification as a guide. This is clearly improper under 35 U.S.C. §103.

Claim 44

Claim 44 expressly indicates that the thermoplastic polymer coating is melt-solidified.

The enclosed Information Disclosure Statement cites three references generally describing the "Shell Process," US 6,569, 918 to Waitkus et al., US 2007/0269593 to Kerns et al. and US 2007/0270524 to Kerns et al. As described there, the Shell Process is primarily used for producing resin coated sand particles for use in the foundry industry as well as proppants. In accordance with the Shell Process, a phenolic resin in flake or powder form is added to sand grains that have been previously heated in a furnace and the mixture so formed agitated at elevated temperature until the resin melts and thereby coats the individual sand grains. Water is then added to quench (cool) the mixture, thereby producing a mass of free-flowing resin coated sand grains. By suitable control of temperatures, times and water addition, it is possible to prevent the thermosetting phenolic resin from curing during this coating operation, which is necessary when foundry sands are produced.

One of the references cited in the corresponding Japanese application and also in the concurrently filed Information Disclosure Statement, Reference 3, Kokai No. 2-106005, in its working example describes a "sports surface" made by depositing a resin-coated sand product on a pile fabric, this resin coated sand product being made by heating a mixture of 3 wt.% phenol resin as a binder, 1.5 wt.% phthalocyanine (a dye) and 95.5 wt.% No. 4 silica sand in a furnace.

Applicants believe this reference demonstrates what the prior art suggests to one of ordinary skill in the art seeking to apply the melt-coating technology of the Shell Process to making resin coated sand products especially useful for making sports surfaces. In particular, this reference shows that a person of ordinary skill in the art, seeking to replace Meredith's emulsion coating technology for making coated sand grains for sports surfaces with the well-known melt-coating technology of the Shell Process, would have been led to select phenolic resins as the polymers to use in this new process since these are the polymers that work in the Shell melt-coating process.

In accordance with this invention, however, applicants recognized that the advantages of the melt coating technology of the Shell Process (simple procedure for producing resin coatings with high strength and toughness) could be combined with the advantages of Meredith's emulsion coating technology (producing resin polymer coatings with desirable softness and elasticity) by using the melt coating technology of the Shell Process to apply a particular resin to the sand grains, provided this particular resin was selected to (1) be thermoplastic, (2) have a melt flow index of 20-40 g/10 min, and (3) have a Shore A hardness of 40-90. Nothing like this is remotely suggested in the prior art.

MPEP §2143.03 sets forth various rationales for supporting a *prima facie* obviousness. For example, this section of the MPEP refers to "Combining Prior Art Elements According to their Known Methods to Yield Predictable Results," "Simple Substitution of One Known Element for Another To Obtain Predictable Results," and "Use of Known Techniques to Improve Similar Devices (Methods, or Products) in the Same Way," etc. Implicit in these rationales is the notion that a desired advantageous result would have been reasonably predictable from the proposed modification of the prior art **because the proposed modification was itself relatively simple and straightforward**. That is to say it is not enough that, after the fact, a person of ordinary skill in the art could assess the modifications made to the prior art and explain how these modifications fit together, following the principles of chemistry and physics, to produce the results being sought. On the contrary, these obviousness rationales contemplate that the proposed modifications must be simple and straight forward enough so that, before they are made, it would have been apparent to one of ordinary skill in the art that they would work to achieve the results being sought.

In this case, the modifications made to the prior art require more than a simple substitution of one material for another, more than combining multiple prior art elements for their known functions and more than use of a known technique to improve a similar device, method or product in the same way. Here, to achieve the inventive coated sand grain product from Meredith, one of ordinary skill in the art would need to change not only the particular resin coating applied to Meredith's sand grain substrates, but also the coating technology used to apply this resin coating. Similarly, to achieve the inventive coated sand grain product from Valligny, one of ordinary skill in the art would need to replace the fundamental process for which

Valligny's resins are used, molding and laminating, to a coating process, then select as the substrate to be coated the sand grain substrates of Meredith, and then carry out the resultant coating process obtained in such a way that the individual sand grains obtained were still loose and free-flowing. In the same way, to achieve the inventive coated sand grain product from the well known Shell Process or the process of Kokai No. 2-106005, one of ordinary skill in the art would need to replace the phenolic resins normally used in this technology with the thermoplastic elastomers of Valligny, even though there is no suggestion in Valligny that these resins could be used for coating applications and even though there is no indication in the references relating to the Shell Process that thermoplastic elastomers could be melt coated.

All of these changes far exceed the simple and straightforward modification contemplated in each of obviousness rationales set forth in MPEP §2143.03, thereby clearly indicating that the present invention, as a whole, is unobvious.

As indicated above, Reference 3, Kokai No. 2-106005, makes clear that a person of ordinary skill in the art who was seeking to adopt the advantages of the melt-coating technology of the Shell Process in making coated sand grains for sports surfaces would be led to select phenolic resins for this purpose. Applicants' rejection of this reasonable suggestion and, instead, adoption of resins previously used only in molding and laminating processes represents a substantial and unobvious advance over the prior art.

If any additional fees are due, the U.S. Patent Office is hereby authorized to charge our Deposit Account No. 03-0172.

Respectfully submitted,

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/s/JEMILLER
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